[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2018-0035; Special Conditions No. 25-714-SC]

Special Conditions: Preferred Improvements, LLC, Boeing Model DC3C Airplanes; Rechargeable Lithium Batteries.

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for Boeing Model DC3C airplanes as modified by Preferred Improvements, LLC. These airplanes will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. This design feature is rechargeable lithium ion backup battery packs installed on the airplanes. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Preferred Improvements, LLC, on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Send your comments by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Send comments identified by docket number FAA-2018-0035 using any of the following methods:

- sFederal eRegulations Portal: Go to http://www.regulations.gov/ and follow the online instructions for sending your comments electronically.
- aMail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- oFax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to http://www.regulations.gov/, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478).

Docket: Background documents or comments received may be read at http://www.regulations.gov/ at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Nazih Khaouly, Airplane & Flight Crew Interface Section, AIR-671, Transport Standards Branch, Policy & Innovation Division, Aircraft

Certification Service, Federal Aviation Administration, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone (425) 227-2432; facsimile (425) 227-1320; e-mail Nazih.Khaouly@faa.gov.

SUPPLEMENTARY INFORMATION:

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected airplanes.

In addition, the substance of these special conditions has been published in the Federal Register for public comment in several prior instances with no substantive comments received. The FAA, therefore, finds it unnecessary to delay the effective date, and finds good cause for making these special conditions effective upon publication in the Federal Register.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On February 1, 2017, Preferred Improvements, LLC, applied for a supplemental type certificate to install a Saab Grintek Impi II tracking system on Boeing Model DC3C airplanes. The tracking system sends altitude and speed information to a ground station via a modem, which contains a rechargeable lithium ion battery.

The Boeing Model DC3C airplane is a narrow-body transport category airplane powered by twin-turbine/piston wing-mounted engines. The airplane has a maximum takeoff weight of 26,900 pounds with seating for 2 crewmembers and 32 passengers.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Preferred Improvements, LLC, must show that the Boeing Model DC3C airplanes, as changed, continue to meet the applicable provisions of the regulations listed in Type Certificate No. A669, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for these airplanes, as modified by Preferred Improvements, LLC, because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the models for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other models included on the same type certificates to incorporate the same novel or unusual design feature, these special conditions would also apply to the other models under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, Boeing Model DC3C airplanes, as modified by Preferred Improvements, LLC, must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34, and the noise certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

Boeing Model DC3C airplanes, as modified by Preferred Improvements, LLC, will incorporate the following novel or unusual design feature: airplane tracking system with a modem containing a rechargeable lithium ion battery.

The battery system consists of the battery, battery charger, and any protective, monitoring, and alerting circuitry or hardware inside or outside of the battery. It also includes vents (where necessary) and packaging. For the purpose of these special conditions, a battery and battery system are referred to as a battery.

Discussion

Rechargeable lithium batteries are considered to be a novel or unusual design feature in transport category airplanes, with respect to the requirements in § 25.1353. This type of battery has certain failure, operational, and maintenance characteristics that differ significantly from those of the nickel-cadmium and lead-acid rechargeable batteries currently approved for installation on transport category airplanes. These batteries introduce higher energy levels into airplane systems through new chemical compositions in various battery-cell sizes and construction. Interconnection of these cells in battery packs introduces failure modes that require unique design considerations, such as provisions for thermal management.

Special Condition 1 requires that each individual cell within a rechargeable lithium battery be designed to maintain safe temperatures and pressures. Special Condition 2 addresses these same issues but for the entire battery. Special Condition 2 requires the battery be designed to prevent propagation of a thermal event, such as self-sustained, uncontrolled increases in temperature or pressure from one cell to adjacent cells.

Special Conditions 1 and 2 are intended to ensure that the cells and battery are designed to eliminate the potential for uncontrollable failures. However, a certain number of failures will occur due to various factors beyond the control of the designer. Therefore, other special conditions are intended to protect the airplane and its occupants if failure occurs.

Special Conditions 3, 7, and 8 are self-explanatory.

Special Condition 4 clarifies that the flammable fluid fire-protection requirements of § 25.863 apply to rechargeable lithium battery installations. Section 25.863 is applicable to areas of the airplane that could be exposed to flammable fluid leakage from airplane systems. Rechargeable lithium batteries contain electrolyte that is a flammable fluid.

Special Condition 5 requires each rechargeable lithium battery installation to not damage surrounding structure or adjacent systems, equipment, or electrical wiring from corrosive fluids or gases that may escape in such a way as to cause a major or more severe failure condition. Special Condition 6 requires each rechargeable lithium battery installation to have provisions to prevent any hazardous effect on airplane structure or systems caused by the maximum amount of heat it can generate due to any failure of it or its individual cells. The means of meeting special conditions 5 and 6 may be the same, but they are independent requirements addressing different hazards. Special Condition 5 addresses corrosive fluids and gases, whereas Special Condition 6 addresses heat.

Special Condition 9 requires rechargeable lithium batteries to have "automatic" means due to the fast acting nature of lithium battery chemical reactions. Manual intervention would not be timely or effective in mitigating the hazards associated with these batteries.

These conditions apply to all rechargeable lithium battery installations in lieu of § 25.1353(b)(1) through (4) at amendment 25-123, or § 25.1353(c)(1) through (4) at earlier

amendments. These regulations will remain in effect for other battery installations on these airplanes.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Applicability

As discussed above, these special conditions are applicable to Boeing Model DC3C airplanes as modified by Preferred Improvements, LLC. Should Preferred Improvements, LLC, apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A699 to incorporate the same novel or unusual design feature, these special conditions would apply to those models as well.

Conclusion

This action affects only a certain novel or unusual design feature on one model of airplane. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Boeing Model DC3C airplanes as modified by Preferred Improvements, LLC.

Rechargeable Lithium Battery Installations

In lieu of § 25.1353(b)(1) through (4) at amendment 25-123, or § 25.1353(c)(1) through (4) at earlier amendments, each rechargeable lithium battery installation must:

1. Be designed to maintain safe cell temperatures and pressures under all foreseeable operating conditions to prevent fire and explosion.
2. Be designed to prevent the occurrence of self-sustaining, uncontrollable increases in temperature or pressure, and automatically control the charge rate of each cell to protect against adverse operating conditions, such as cell imbalance, back charging, overcharging and overheating.
3. Not emit explosive or toxic gases, either in normal operation or as a result of its failure that may accumulate in hazardous quantities within the airplane.
4. Meet the requirements of § 25.863.
5. Not damage surrounding structure or adjacent systems, equipment, or electrical wiring from corrosive fluids or gases that may escape in such a way as to cause a major or more-severe failure condition.
6. Have provisions to prevent any hazardous effect on airplane structure or systems caused by the maximum amount of heat it can generate due to any failure of it or its individual cells.
7. Have a failure sensing and warning system to alert the flight crew if its failure affects safe operation of the airplane.
8. If its function is required for safe operation of the airplane, have a monitoring and warning feature that alerts the flight crew when its charge state falls below acceptable levels.

9. Have a means to automatically disconnect from its charging source in the event of an over-temperature condition, cell failure or battery failure.

Note: A battery system consists of the battery, battery charger and any protective, monitoring and alerting circuitry or hardware inside or outside of the battery. It also includes vents (where necessary) and packaging. For the purpose of this special condition, a battery and battery system are referred to as a battery.

Issued in Renton, Washington, on January 17, 2018.

/s/

Victor Wicklund
Manager, Transport Standards Branch
Policy & Innovation Division
Aircraft Certification Service

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